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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/566,099

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EXAMINER

CAMPBELL, NATASHA N.

ART UNIT

PAPER NUMBER

1714

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,099	<b>Applicant(s)</b> OHMI ET AL.	
	<b>Examiner</b> NATASHA CAMPBELL	<b>Art Unit</b> 1714	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 March 2011.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

1. Applicants' amendments and remarks in the reply filed 03/04/2011 have been acknowledged and entered.
2. Claims 1-14 are currently pending.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyata et al. (US 6,300,226).
5. Regarding Claim 1: Miyata teaches a silicon carbide product comprising chemical vapor deposited polycrystalline silicon carbide (col. 4, lines 1-10) free from sintering agent and having a surface with a concentration of metal impurities less than  $1 \times 10^{11}$  atoms/cm<sup>2</sup> (col. 5, lines 59-62).
6. Regarding Claim 3: Miyata further teaches that the product is a structure (see abstract).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Art Unit: 1714

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al. (US 6,300,226) as applied to Claim 1 above, and as evidenced by Kamisuki et al. (US 6,436,361).

11. Regarding Claim 2: Miyata teaches the elements of Claim 1, and teaches that the product has a surface with a concentration of metallic impurities less than  $1 \times 10^{11}$  atoms/cm<sup>2</sup>, as described above. Miyata does not expressly disclose the type of metal impurities. However, it is well known that metallic impurities of iron, nickel, and copper are commonly associated with silicon carbide production, as evidenced by Kamisuki (col. 4, lines 34-37). Therefore, it is reasonably expected that the metallic impurities referred to by Miyata includes that of Fe, Ni, and Cu.

12. Claims 4-8 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanino et al. (US 6,187,279), as evidenced by Holmes et al. (US 5,770,324).

13. Regarding Claims 4-6: Tanino teaches a method of cleaning a CVD polycrystalline silicon carbide product with HF (col. 3, lines 25-27 and 37-40). Although he does not specifically teach the manner in which the product is contacted by the acid, one of ordinary skill in the art would have reasonably expected that cleaning by immersion of the product in the acid would yield predictable results of cleaning the product. It is noted that the prior art does not expressly disclose that the cleaning is accomplished such that metal impurities have a concentration of  $1 \times 10^{10}$  atoms/cm<sup>2</sup>. However, it is noted that by performing the claimed cleaning step under the same general conditions disclosed by applicant, and in absence of any further steps or conditions, it is reasonably expected to achieve the same results of removing the

Art Unit: 1714

metallic impurities to the extent as claimed. Further, Holmes teaches that an acceptable standard for clean silicon semiconductor products is such that the surfaces have  $10^{10}$  atoms/cm<sup>2</sup> or less metal impurities (see col. 2, lines 31-44). Therefore, one of ordinary skill in the art at the time of the invention would have been motivated to clean products to achieve the claimed result in order to be within the acceptable clean requirements.

14. Regarding Claims 7 and 8: Tanino in view of Holmes teaches Claims 7, as described above. Tanino teaches HF acid, but does not teach the concentration of the HF acid. However, it is noted that where the general conditions of the claim are taught by the prior art, one of ordinary skill in the art would find it obvious to optimize the conditions through routine experimentation (see MPEP 2144.05). Therefore, a skilled artisan would have been motivated to modify the method to use an HF concentration of about 50% as claimed in order to enhance the cleaning efficiency.

15. Regarding Claim 14: Tanino and Holmes teach the elements of Claim 5. Tanino further teaches that the product is a semiconductor device (col. 1, lines 7-10).

16. Claims 6, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanino et al. (US 6,187,279) and Holmes et al. (US 5,770,324) as applied to Claim 5, and further in view of Ariga et al. (JP 11-008216; machine translation).

17. Regarding Claims 6: Tanino and Holmes teach the elements of Claim 5, as described above. Tanino does not teach that the acid is HCl. However, Ariga teaches that a silicon carbide product is cleaned with either HF or HCL to remove Fe, Ni, and Cu impurity ([0006] and [0016]). Therefore, one of ordinary skill in the art at the time of the

Art Unit: 1714

invention would have been motivated to clean the product with HCl, as taught by Ariga, in order to remove the metal impurities contamination on the surface.

18. Regarding Claims 9 and 10: Tanino, Holmes, and Ariga teach the elements of Claim 6, as described above. Ariga is cited for teaching the use of HCl to clean the surface, but does not expressly disclose the concentration. However, where the general conditions of the claim are taught by the prior art, one of ordinary skill in the art would find it obvious to optimize the conditions through routine experimentation (see MPEP 2144.05). Therefore, a skilled artisan would have been motivated to modify the method to use an HCl concentration of about 36% as claimed in order to enhance the cleaning efficiency.

19. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanino et al. (US 6,187,279) and Holmes et al. (US 5,770,324) as applied to Claim 5, and further in view of Lin et al. (US 7,037,816).

20. Regarding Claim 11: Tanino and Holmes teach the elements of Claim 5, as described above. They do not teach cleaning the product with a liquid containing sulfuric acid and a hydrogen peroxide solution. However, Lin teaches that it is known to clean a SiC product with a sulfuric acid and hydrogen peroxide solution (col. 3, lines 20-25). Therefore, one of ordinary skill in the art would have been motivated to clean the product with the claimed solution, as taught by Lin, with a reasonable expectation of achieving a cleaned surface.

Art Unit: 1714

21. Regarding Claims 12 and 13: Lin does not expressly teach the pH or concentration of the solution. However, where the general conditions of claim are taught by the prior art, one of ordinary skill in the art would find it obvious to optimize those variables which are result-effective variables, such as the pH or concentration of a cleaning solution. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the pH or concentration to achieve that as claimed in order to enhance the cleaning efficiency of the solution.

### ***Response to Arguments***

22. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

23. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

24. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any



Art Unit: 1714

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATASHA CAMPBELL whose telephone number is (571)270-7382. The examiner can normally be reached on Monday-Friday; 9 AM-5 PM.

26. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on (571) 272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

27. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. C./

Examiner, Art Unit 1714

17 June 2011

Application/Control Number: 10/566,099

Page 9

Art Unit: 1714

/Michael Kornakov/  
Supervisory Patent Examiner, Art Unit 1714